REMARKS

The Present Invention

The invention relates to recording media, coating compositions useful in making recording media, and methods of preparing the same. Claims 1-5, 7, 27-30, 33, and 44-57 are currently pending and are directed to recording media.

Summary of the Office Action

The Office Action alleges that the pending claims present distinct inventions under 35 U.S.C. § 121 and has made final a requirement to restrict the application to one of three groups of claims: Group I consisting of claims 1-7, 27, and 28, Group II consisting of claims 8-24, or Group III consisting of claims 25 and 26. The Office Action has applied the restriction requirement to claims added by the applicants' prior amendment by dividing the new claims into Group I consisting of claims 29-33, and Group II consisting of claims 34-43.

The Office Action rejects the pending claims under 35 U.S.C. § 112, second paragraph, as indefinite for recitation of the term "glossy" and the phrases "less than about," "at least about," and "greater than about." The Office Action also rejects claim 7 under Section 112, second paragraph, as lacking antecedent basis for the term "pigment." The Office Action rejects claims 1, 5-8, 13, and 25-30 under 35 U.S.C. § 102(b) as anticipated by each of EP 803374 A2 (Liu et al.) and U.S. Patent 5,677,034 (Okazaki et al.). The Office Action also rejects claims 1-6, 13, 24, 26, and 28-33 under 35 U.S.C. §102(e) as anticipated by U.S. Patent 6,124,031 (Yoshida et al.). Finally, the Office Action rejects claims 6-8, 25, 27, and 31-33 under 35 U.S.C. § 103(a) as obvious over Liu et al. and Okazaki et al. in combination with Yoshida et al. and U.S. Patent 5,399,407 (Hatanaka et al.).

Clarification Regarding Paragraph 1 of the Office Action

Paragraph 1 of the Office Action states: "Preliminary amendments to the specification and claims 5, 10, 15, and 29-43, filed on January 18, 2002, have been entered in the above-identified application." However, no preliminary amendment was filed on January 18, 2002. The applicants assume that the Office Action intended to refer to the Response to Office Action, which was filed on December 18, 2001, and which set forth amendments to the specification and claims 5, 10, 15, and 29-43.

Discussion of the Amendments

The abstract of the pending application has been amended so as to comport with the invention as defined by the pending claims and, thereby, more properly comply with 35 C.F.R. § 1.72. Also, the paragraph appearing at page 7, line 32 – page 8, line 7 of the specification has been amended to correct typographical errors.

The pending claims have been amended to more particularly point out and distinctly claim the subject matter which the applicants regard as their invention. In particular, the pending claims have been amended to recite alumina particles having a surface area of about 30-80 m^2/g, as formerly recited in claim 32. In view of this amendment, claims 6, 31, and 32 have been cancelled as superfluous. Claim 7 has been amended to replace the term "pigment" with the term "alumina." Amended claim 7 is supported by the specification, for example, at page 2, lines 7-8, and page 15, line 28, through page 16, line 2, which clearly indicates that the pigment to which claim 7 refers is alumina. Claim 27 has been rewritten in independent form, and claim 28 has been amended so as to depend from claim 27. New claims 44-57 have been added, which are directed to additional aspects of the invention, as supported by the claims as originally filed, and the specification, for example, at p. 10, lines 22-23, p. 14, lines 25-29, and p. 16, lines 5-9. No new matter has been introduced by way of these amendments.

Response to the Restriction Requirement

In response to the restriction requirement, the applicants confirm their election of claims 1-7 and 27-33 for prosecution. Accordingly, claims 8-26 and 34-43 have been cancelled.

Discussion of the Section 112 Rejections

The Office Action rejects claim 7 as lacking proper antecedent basis for the term "pigment" recited therein. Claim 7 has been amended to replace the term "pigment" with the term "alumina." As previously mentioned, the specification clearly indicates that the pigment to which claim 7 formerly referred is alumina. In view of this amendment, the rejection of claim 7 is moot.

The Office Action rejects the pending claims as indefinite under Section 112, second paragraph, for recitation of the term "glossy." Specifically, the Office Action argues that the term "glossy" is a relative term, which is not defined in the specification or claims by a specific gloss value, such that one of ordinary skill in the art would not reasonably be apprised of the scope of the claims.

The applicants disagree with the Office Action's position that the recitation of the term "glossy" renders the scope of the pending claims indefinite. In particular, the terms "glossy" and "gloss" are routinely used in the art to describe the surface layer of recording media. Indeed, these terms are recited in the claims of many issued U.S. patents without any further definition (*see, e.g.*, U.S. Patents 6,335,085, 6,245,422, 6,161,928, 5,952,051, and 5,741,584). Nevertheless, in order to expedite the prosecution of the present application, the pending claims have been amended to recite that the glossy coating has a *75° specular gloss of at least about 15%*, thereby rendering this rejection moot.

The Office Action rejects claims 5, 7, 8, and 13 as indefinite for recitation of the phrases "less than about," "at least about," and "greater than about." Specifically, the Office Action alleges that these phrases are indefinite because "less than," "at least," and "greater than" are mathematical expressions that have exact meanings, which expressions are allegedly rendered indefinite when used in conjunction with an inexact amount (*e.g.*, "less than *about* 30-80 m^2/g"). In order to overcome the rejection, the Office Action recommends rewording the claims to avoid using mathematical expressions by using instead the phrases "about X amount or less," or "about X amount or more," which allegedly are not mathematical expressions. The applicants traverse this rejection.

The phrases "less than about," "at least about," and "greater than about" have long been considered acceptable for use in patent claims without rendering such claims indefinite and are synonymous with "about X amount or less" and "about X amount or more," respectively. Evidence of the longstanding accepted use of these phrases in U.S. patent claims is evidenced by a brief review of U.S. patents issued over the last 20 years. For example, a brief computer search of U.S. patents issued since 1971 indicates that well over 52,000 U.S. patents have been issued with claims that recite the phrase "at least about"; over 3,000 of these patents have issued within the last year. The phrases "less than about" and "greater than about" have been used with similar frequency. Although the Office Action

argues that the phrases used in the pending claims have a "special" meaning when used in the context of mathematics, the applicants submit that the phrases as recited in the pending claims are to be accorded their ordinary meaning, which is no different from the language suggested by the Office Action. Accordingly, the phrases "less than about," "at least about," and "greater than about" do not render the pending claims indefinite.

For the foregoing reasons, the pending claims meet the requirements of Section 112, second paragraph, and the rejection of the pending claims under this section should be withdrawn.

Discussion of the Section 102(b) Rejection Over the Liu et al. '374 Application

The Office Action rejects the pending claims as anticipated by the Liu et al. '374 application. Specifically, the Office Action alleges that the Liu et al. '374 application discloses a recording medium comprising a substrate having a coating thereon, wherein the coating comprising alumina particles and a binder, and the alumina particles are aggregates of primary particles. The applicants traverse this rejection.

Contrary to the Office Action's allegations, the Liu et al. '374 application does not disclose the use of *alumina* particles that are aggreates of primary particles, as recited in the pending claims. Rather, the Liu et al. '374 application is specifically directed to the use of silica or *alumina silicate* particles (*e.g.*, the Liu et al. '374 application at p. 4, lines 33-35). As explained in the Liu et al. '374 application, alumna silicate particles are produced by hydrolyzing a mixture of an aluminum alkoxide and silicon alkoxide to provide a complex product containing *alumina moieties and silica moieties that cannot be isolated from one another* (the Liu et al. '374 application at p. 6, lines 5-8). Those of ordinary skill in the art would appreciate that alumina (Al_2O_3) and alumina silicate ($(Al_2O_3)_x \cdot (SiO_2)_y \cdot (H_20)_z$) are distinctly different materials having significantly different chemical and physical properties. Indeed, the Liu et al. '374 application itself distinguishes the use of alumina silicate particles from the use of alumina particles by reference to comparative examples illustrating the use of primary alumina particles (*e.g.*, non-aggregate particles of alumina, which are different from the alumina particles recited in the pending claims) (*see, e.g.*, the Liu et al. '473 application at p. 16 (comparative example I-4) and p. 21 (comparative example II-2)).

While the applicants believe that this difference is sufficient to distinguish the invention recited in the pending claims from the disclosure of the Liu et al. '374 application, the pending claims have been amended to more particularly point out and distinctly claim the subject matter which they consider to be their invention, thereby further distinguishing the invention from the disclosure of the Liu et al. '374 application. In particular, the pending claims, as amended, recite alumina particles that have a *surface area of about 30-80 m^2/g*. The Liu et al. '374 application does not disclose the use of alumina particles having any particular surface area, much less alumina particles having the surface area characteristics recited in the pending claims.

As the Liu et al. '374 application does not disclose all of the elements recited in the pending claims, it cannot anticipate the pending claims. Accordingly, the Section 102(b) rejection of the pending claims over the Liu et al. '374 application should be withdrawn.

Discussion of the Section 102 (b) and (e) Rejections Over the Okazaki et al. '034 Patent and the Yoshida et al. '031 Patent

The Office Action rejects the pending claims as anticipated by each of the Okazaki et al. '034 patent and the Yoshida et al. '031 patent. In particular, the Office Action alleges that each of these patents discloses a recording medium comprising a substrate having a coating thereon, wherein the coating comprises alumina particles and a binder, and the alumina particles are aggregates of primary particles. The applicants traverse this rejection.

Contrary to the allegations of the Office Action, neither the Okazaki et al. '034 patent, nor the Yoshida et al. '031 patent, discloses a "recording medium" as that term is used in conjunction with the invention. As explained in the applicants' prior Response to Office Action (dated December 18, 2001), the recording medium of the invention is of the type that is suitable for use in conjunction with *ink-printing processes* (*e.g.,* ink-jet paper) (*e.g.*, the specification at page 1, lines 16-20). By way of contrast, the Okazaki et al. '034 patent and the Yoshida et al. '031 patent are directed to polyester films (*e.g.*, the Okazaki et al. '034 patent at col. 1, lines 10-13; the Yoshida et al. '031 patent at col. 1, lines 5-14). Although the polyester films disclosed in these patents can be used as substrates for magnetic recording mediums, *neither a polyester film nor a magnetic recording medium is a "recording medium" as that term is used in conjunction with the present invention.*

Furthermore, the polyester films disclosed in the Okazaki et al. '034 patent and the Yoshida et al. '031 patent do not comprise a *glossy coating comprising alumina particles*. Although the polyester films disclosed in these patents contain alumina particles, *the alumina particles are not contained within a coating that is applied to the film; instead, the alumina particles are embedded within the film itself* (*e.g.*, the Okazaki et al. '034 patent at col. 1, lines 55-58; the Yoshida et al. '031 patent at col. 2, lines 5-10). Thus, a magnetic recording medium made from the polyester films by coating the films with a magnetic coating, as disclosed in these patents, does not meet the claim elements inasmuch as the alumina particles are contained in the polyester film substrate of the magnetic recording medium, not in a glossy coating as recited in the pending claims (*e.g.*, the Okazaki et al. '034 patent at col. 9, lines 2-5; the Yoshida et al. '031 patent at col. 16, line 66 – col. 17, line 5).

As the Okazaki et al. '034 and Yoshida et al. '031 patents do not disclose all of the elements recited in the pending claims, these patents do not anticipate the subject matter of the pending claims. Accordingly, the Section 102(b) and (e) rejections based on these references should be withdrawn.

Discussion of the Section 103(a) Rejections

The Office Action rejects claims 6 and 31-33 as allegedly obvious over the Liu et al. '374 application, or the Okazaki et al. '034 patent, in combination with the Yoshida et al. '031 patent. In particular, the Office Action acknowledges that the Liu et al. '374 application and the Okazaki et al. '034 patent do not disclose the use of pigment particles having any particular surface area characteristics, but alleges that it would have obvious to one of ordinary skill in the art at the time the present application was filed to use such alumina particles in conjunction with the recording medium disclosed in the Liu et al. '374 application because Yoshida et al. allegedly discloses that "surface area is directly related to particle size, and controlling the particle size can result in improved slipping properties, abrasion resistance, and scratch resistance" (the Office Action at ¶¶ 13 and 14). The Office Action relies on the Hatanaka et al. '407 patent for its alleged disclosure of the use of particular amounts of alumina particles. The applicants traverse this rejection.

The Section 103(a) rejections are based on non-analogous art. In determining whether a claimed invention would have been obvious over the prior art, the Patent Office

must first determine the scope of the prior art to which the claimed subject matter pertains. *Monarch Knitting Machinery v. Sulzer Morat GMBH*, 139 F.3d 877 (Fed. Cir. 1998); *In re Oetiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992); *In re Clay*, 966 F.2d 656, 658 (Fed. Cir. 1992). This inquiry is frequently couched in terms of whether or not art is analogous to the claimed subject matter, *i.e.*, whether the art is too remote to be treated as prior art. *In re Clay* at 658. Prior art is analogous to the claimed subject matter only if (a) the art is from the same field of endeavor as that in which the inventor of the claimed subject matter was working, or (b) the art is reasonably pertinent to the particular problem with which the inventor was faced. *Id.* at 658-659. An art reference is reasonably pertinent to a particular problem if "it is one which, because of the matter with which it deals, would have commended itself to an inventor's attention in considering his problem." *Id.* at 659. The combination of elements from non-analogous art references to reconstruct the applicants' invention with the benefit of hindsight improperly engages the knowledge supplied by the applicants' invention itself, and cannot present a *prima facie* case of obviousness under Section 103. *In re Oetiker* at 1447.

The field of endeavor of the present invention is the field of recording media of the type used for ink printing processes. By way of contrast, both the Okazaki et al. '034 patent and the Yoshida et al. '031 patent are directed to a thermoplastic polyester composition of the type used to produce a formed product such as a film or a fiber (*e.g.*, a film used in making a magnetic tape). Thus, the Okazaki et al. '034 patent and the Yoshida et al. '031 patent clearly are not from the same field of endeavor as the present invention. Furthermore, the disclosures of the Okazaki et al. '034 patent and the Yoshida et al. '031 patent cannot be considered to be reasonably pertinent to the technical problem with which the inventors of the present invention were faced when they invented the subject matter recited in the pending claims. In particular, the Okazaki et al. '034 patent and the Yoshida et al. '031 patent are expressly directed to improving the slipping property, abrasion resistance, and scratch resistance of polyester fibers or films (*e.g.*, of a magnetic tape, which repeatedly runs in contact with a guide pin at a high speed) by incorporating alumina particles into the polyester fibers or films (*e.g.*, the Okazaki et al. '034 patent at col. 1, lines 40-50; the Yoshida et al. '031 patent at col. 1, lines 55-61). These concerns are vastly different from the technical problems presented in the field of the present invention (*e.g.*, ink-absorbtion, dye fixing, water-fastness, gloss, etc.) (*e.g.*, specification at pp. 1-3, generally).

Thus, the Okazaki et al. '034 patent and the Yoshida et al. '031 patent are non-analogous art with respect to the present invention, and cannot properly be relied upon in support of the Section 103(a) rejections. Accordingly, the Section 103(a) rejections based on these references should be withdrawn for this reason alone.

There is no motivation to combine the disclosure of the Liu et al. '374 application with that of the Yoshida et al. '031 patent. Even if the Yoshida et al. '031 patent was analogous art with respect to the present invention, which it is not, there is no motivation to combine the disclosure of the Liu et al. '374 application with the disclosure of the Yoshida et al. '031 patent in such a way as to arrive at the invention defined by the pending claims. The Office Action alleges that it would have been obvious to one of ordinary skill in the art to use the alumina particles disclosed in the Yoshida et al. '031 patent in the recording medium disclosed in the Liu et al. '374 patent because doing so can improve the slippage resistance, abrasion resistance, or scratch resistance of the recording medium. However, as previously mentioned, the Yoshida et al. '031 patent discloses that these properties are advantageous in the context of a polyester film, such as a magnetic tape, that runs at high speeds while in contact with a guide pin or similar apparatus. Since the Liu et al. '374 application is not directed to a polyester film or a magnetic tape that uses a polyester film (or any other type of media that runs at high speeds in contact with a guide pin or similar apparatus), the advantages of using the alumina particles that are disclosed in the Yoshida et al. '031 patent are inapplicable to the Liu et al. '374 application. Thus, the reasons relied upon by the Office Action do not provide the requisite motivation to combine the cited references.

Moreover, there is no other motivation to combine or modify the cited references in such a way as to arrive at the invention defined by the pending claims. To the contrary, the cited references themselves teach away from the combination suggested by the Office Action. In particular, the Liu et al. '374 application is directed specifically to the use of *silica or alumina silicate particles*, which is disclosed as an *improvement* over the use of alumina particles (*e.g.*, the Liu et al. '374 application at pp. 16 and 21 (comparative examples I-4 and II-2)). Accordingly, one of ordinary skill in the art considering the Liu et al. '374 application would not be motivated to substitute the alumina particles disclosed in the Yoshida et al. '034 patent, or any other reference, for the alumina-silicate particles disclosed in the Liu et al. '374 application.

For the foregoing reasons, there is no motivation to combine the cited references in such a way as to render obvious the subject matter of the pending claims. Accordingly, the Section 103(a) rejection should be withdrawn for this additional reason. Although the Office Action does not allege that it would have been obvious to combine the disclosure of the Liu et al. '374 application with that of the Okazaki et al. '034 reference, the applicants note that the Okazaki et al. '034 reference is directed to subject matter that is similar to that of the Yoshida et al. '031 patent. Thus, the comments set forth above with respect to the Yoshida et al. '031 patent apply with equal weight to Okazaki et al. '034 patent.

The combined references do not yield the present invention. Finally, even if one of ordinary skill in the art were motivated to combine the cited references in the manner suggested by the Office Action, which they would not be, the combined disclosures of the cited references would not lead one of ordinary skill in the art to the present invention. For example, the combined disclosures of the Liu et al. '374 application and the Yoshida et al. '031 patent or the Okazaki et al. '034 patent, to the extent they can be combined at all, would not lead one of ordinary skill in the art to a recording medium with a *glossy coating comprising alumina particles*, but, instead, would lead one to a recording medium with a *polyester substrate that contains alumina particles*; any coating composition would necessarily contain *alumina silicate* particles consistent with the disclosure of the Liu et al. '374 application. Similarly, the combined disclosures of the Okazaki et al. '034 patent and the Yoshida et al. '031 patent would not lead one of ordinary skill in the art to a recording medium at all; rather, such a combination would lead one to an *alumina-containing polyester substrate*, which may be used to produce a magnetic recording medium. Thus, none of the cited references, either alone, or in combination, discloses a recording medium with a glossy coating that comprises alumina particles having a surface area of 30-80 m^2/g, as recited in the pending claims.

The Office Action relies upon the Hatanaka et al. '407 patent for its disclosure of the use of certain amounts of alumina particles. However, the Hatanaka et al. '407 reference is directed to magnetic recording media and is, therefore, considered to be non-analogous art with respect to the present invention for the same reasons as discussed above with respect to the Yoshida et al. '031 patent and the Okazaki et al. '034 patent. Furthermore, even if the

Hatanaka et al. '407 patent were analogous to the invention, which it is not, the Hatanaka et al. '407 patent does not supply the missing disclosures of the other references.

As none of the cited references, alone or in combination, disclose all elements of the pending claims, the cited references do not render the subject matter of the pending claims obvious. Accordingly, the Section 103(a) rejections should be withdrawn.

Conclusion

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

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Date: August 9, 2002

CERTIFICATE OF MAILING

I hereby certify that this RESPONSE TO OFFICE ACTION (along with any documents referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231.

Date: August 9, 2002

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
DARSILLO et al.

Application No. 09/670,118

Filed: September 26, 2000

For: RECORDING MEDIUM

Art Unit: 1773

Examiner: K. Bernatz

AMENDMENTS TO ABSTRACT, SPECIFICATION, AND CLAIMS MADE IN RESPONSE TO OFFICE ACTION DATED APRIL 9, 2002

Amendments to the Abstract:

[The present invention provides a] A recording medium comprising a substrate having a glossy coating thereon, wherein the glossy coating comprises a binder and alumina particles that are aggregates of primary particles. [The present invention further provides a coating composition comprising the aforesaid alumina particles and a binder, wherein the solids content of the alumina in the coating composition is at least about 10 wt.%.

The present invention also provides a method of preparing a coating composition, which method comprises providing a colloidally stable dispersion of the aforesaid alumina particles, wherein the solids content is greater than about 20 wt.%; adding a binder to and, optionally, diluting the dispersion; and, optionally, adjusting the pH with a suitable acid or base.

The present invention further provides a method of preparing a recording medium, which method comprises providing a substrate, coating the substrate with the coating composition of the present invention, optionally calendering the coated substrate, and drying the coated substrate.]

Amendment to the specification:

The paragraph appearing at page 7, line 32 – page 8, line 7, has been amended as follows:

In certain preferred embodiments, the mean diameter of the alumina particles is at least about 40 nm (e.g., particles having a mean diameter from about 40 nm to about 300 nm, preferably from about 80 nm to about 300 nm, more preferably from about 100 nm to about

200 nm, still more preferably from about 120 nm to about 190 nm, and most preferably from about 140-180 nm (e.g., from about 150-170 nm)). In certain of these embodiments, at least about 80% (e.g., at least about 90%) or substantially all of the alumina particles have diameters of at least about 100 nm (e.g., from about 100 nm to about 200 nm, more preferably from about 120 nm to about 190 nm, and most preferably from about 140-180 nm (e.g., from about 150-170 nm)).

Amendments to existing claims:

Claims 6, 8-26, 31, 32, and 34-43 are cancelled.

1. A recording medium comprising a substrate having a glossy coating thereon, the glossy coating comprising alumina particles and a binder, wherein the alumina particles are aggregates of primary particles and have a surface area of about 30-80 m^2/g, and the glossy coating has a 75° specular gloss of at least about 15%.

7. The recording medium of claim 1, wherein the [pigment] alumina to binder ratio is at least about 2:1 by weight.

27. A recording medium prepared by [the method of claim 25] a method comprising

(a) providing a substrate,

(b) coating the substrate with a coating composition comprising alumina particles and a binder, wherein the alumina particles are aggregates of primary particles, and the solids content of the alumina in the composition is at least about 10 wt.%, and

(c) drying the coated substrate to provide the recording medium.

28. [A] The recording medium [prepared by the method of claim 26] of claim 27, wherein the coating composition has a solids content of alumina in the composition of at least about 20 wt.%.

New Claims:

44. (New) The recording medium of claim 7, wherein the alumina to binder ratio is at least about 7:1.

45. (New) The recording medium of claim 44, wherein the alumina to binder ratio is at least about 9:1.

46. (New) The recording medium of claim 1, wherein the glossy coating has a 75° specular gloss of at least about 65%.

47. (New) The recording medium of claim 1, wherein the glossy coating has a total mercury intrusion volume of at least about 0.3 ml/g.

48. (New) The recording medium of claim 47, wherein the glossy coating has a total mercury intrusion volume of at least about 0.8 ml/g.

49. (New) The recording medium of claim 4, wherein the aggregates have a mean diameter of less than about 1 μm.

50. (New) The recording medium of claim 49, wherein the aggregates have a mean diameter of about 80-300 nm.

51. (New) The recording medium of claim 50, wherein the aggregates have a mean diameter of about 100-200 nm.

52. (New) The recording medium of claim 4, wherein the alumina to binder ratio is at least about 2:1 by weight.

53. (New) The recording medium of claim 52, wherein the alumina to binder ratio is at least about 9:1.

54. (New) The recording medium of claim 4, wherein the aggregates have a surface area of about 40-60 m^2/g.

55. (New) The recording medium of claim 4, wherein the glossy coating has a 75° specular gloss of at least about 65%.